

BOOK REVIEWS

The Irony Age

The End of Science. Facing the Limits of Knowledge in the Twilight of the Scientific Age. JOHN HORGAN. Helix (Addison-Wesley), New York, 1996. x, 309 pp. \$24 or \$C33.

Science has flourished for a few hundred years, but there's no reason to expect it to go on forever. Is the end already in sight? John Horgan, who writes for *Scientific American*, says there's plenty of reason to think it might be. For one thing, science, unlike, say, literature, has the bad habit of answering the questions it poses. Sooner or later, that will leave it without much to do. For another, it may have outrun society's ability or willingness to foot the bills (remember the Superconducting Super Collider). Even more chilling, we may be nearing the outermost limits of what the human mind can comprehend. A rat can learn to turn left at every second fork in a maze, but not at every fork corresponding to a prime number (this from an interview with Noam Chomsky). The human mind, subject to the same biological constraints, may have reached the limits of its abilities to comprehend. We are animals, not angels.

On the other hand, it may just be that we have already found The Truth. Once biology has evolution and DNA, the rest is largely a matter of filling in the details. The big bang is the central fact of cosmology, the standard model gives us the main outlines of what matters about matter, and the laws of physics are relativity and quantum mechanics, possibly soon to be tied up with superstrings in a neat bundle. What more do we need to know?

Of course physicists are supposed to have had this same complacent attitude just a century ago. That's invariably the first objection everyone raises to his thesis, and Horgan meets it head on. He quotes the famous sixth-decimal-place speech, usually attributed to Kelvin but actually due to A. A. Michelson. The situation is clearly different now. Or is it?

This is itself a Big Question. To investigate, Horgan does what he does for a living, he interviews scientists (also philosophers and others). Obviously, we're not talking here about day-to-day, bench-top empirical science. Horgan is after

practitioners of what he calls ironic science (Horgan was into literary criticism before he became a science writer). Ironic science is post-empirical philosophical theorizing, science as literature, and, above all, the quest for The Answers to The Big Questions.

All of this is fun to read in spite of its grim subject matter. Horgan writes gracefully and well, and he seems to have interviewed everyone who's anyone among the deep thinkers. (He managed to catch Popper and Feyerabend before they died but missed Feynman, whom he quotes from published sources. Horgan's interview with Feynman would be something to contemplate.) Unfortunately, the book loses some of its momentum in a series of chapters designed by formula. The chapters are titled "The end of . . ." and then take up, in order, progress, philosophy, physics, cosmology, evolutionary biology, social science (no kidding), neuroscience (enough already!), chaoplexity, limitology, and, finally, machine science. Horgan refers to this last also as scientific theology, affording him the occasion to present his own, not very convincing, form of theology. In his acknowledgements, Horgan thanks his agent for helping him "turn an amorphous idea into a marketable proposal." It might have been better if he had just written a book.

Part of the fun of reading this book is poking holes in the author's pretensions as well as his arguments. Horgan is the sort of science groupie who asks physicists, Who's the smartest of them all? (answer below). On the other hand, he seldom reports an interview without a few barbed comments that let you know that this was really a battle of wits that he, Horgan, finally won. At the end of one interview, Mitchell Feigenbaum whacks his shin against a coffee table. Horgan writes: "The suddenly malevolent-looking coffee table seemed to be gloating: 'I refute Feigenbaum thus.'" On a nastier note, he says of Nobel Prize-winner Gerald Edelman, "He is a practitioner of ironic neuroscience, one who, unfortunately, lacks the requisite rhetorical skills." You would think scientists would start to regard Horgan the way CEOs regard Mike Wallace.

The answer to the smartest-of-them-all

question turns out to be Edward Witten (there are a few votes for Weinberg and Gell-Mann, but Witten is the consensus winner). Witten qualifies as an ironic scientist because he does superstring theory, which cannot be tested empirically (Horgan speaking; Witten wouldn't agree). But he's a spectacularly naïve ironic, belonging to a category who think they discover, not invent, their theories, independently of any cultural or historical context. As Horgan represents him, he sees himself as "just a conduit through which truths pass from the Platonic realm to the world of flesh." Game, set, and match; Horgan has topped The Smartest of Them All. But earlier in the book, Horgan has told us that he believes present-day science, "this modern myth of creation," will survive for a thousand years. "Why? Because it is true." So much for philosophically sophisticated, socially constructed science.

In spite of all that, this book has a great deal going for it, and it does raise a genuinely important question. Do we still have before us the kind of great discoveries that ennoble the everyday work that most of us do as scientists? What will they be? The origin of life, the nature of consciousness, intelligent life out there, which laws of physics are fundamental and which are accidents of the history of this particular universe? Or perhaps, to quote Horgan quoting Feynman (without half trying the deepest thinker of them all), "We are lucky to live in an age in which we are still making discoveries. [This] is the age in which we are discovering the fundamental laws of nature, and that day will never come again." Science will go on (maybe), but what Horgan calls "science at its purest and grandest, the primordial human quest to understand the universe and our place in it" will give way to mere philosophizing.

Pity, that, if it's true. It was great fun while it lasted. Until the last few chapters, when Horgan himself falls into the mere-philosophizing trap, the book is great fun too.

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